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ABSTRACT

Three presentations are provided from Symposium 38, Advances in Distance Learning, of the Academy of Human Resource Development 2000 Conference Proceedings. "Teaching Strategies in a Synchronous Learning Environment for Adult Students" (Luis A. C. Lima, Kathryn S. Hoff) reports the responses of intact cohort groups enrolled in spring semester 1999 to two learning style instruments and results that indicate preference for use of discussion, peer teaching, independent study, and lecture. "The Influence of Learning Style Preferences on Student Success in Online vs. Face-to-Face Environments" (Steven R. Aragon, Scott D. Johnson, Najmuddin Shaik) reports significant relationships between preferences and course success on five constructs for the face-to-face students and no significant relationships for the online students. Findings suggest students can be equally successful in both environments regardless of learning style preferences. "The Impact of a Distance Training System (DTS) with Two Distance Training Delivery Processes (DTDPs) on Trainee Satisfaction and Individual Job Performance: A Case Study" (Maria Hruby Moore) focuses on multiple regression output that suggests DTDP was not a significant contributor to trainee satisfaction or placements; work experience and manager involvement were statistically significant in predicting trainee satisfaction; and sales experience, manager involvement, and work environment were statistically significant in predicting the number of placements. The papers contain reference sections. (YLB)

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Teaching Strategies in a Synchronous Learning Environment for Adult Students

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This study investigated students'learning styles and reported preference for teaching strategies in a synchronous distance learning environment. Its aim was to improve instruction by using learning styles as a frame of reference guiding the design of instruction. Intact cohort groups enrolled in the spring semester 1999 responded to two learning style instruments and a demographic questionnaire. Results indicated preference for the utilization of discussion, peer-teaching, independent study, and lecture in this instructional environment.

Keywords: Adult Learning, Video Conferencing, Learning Styles

Significant socio-economic changes over the last two generations have placed an increasingly higher demand on continuing and adult education to attend to a variety of societal variables. More recently, advancements in telecommunication and computer technologies have simplified the access to information and changed the economic structure from production-based to knowledge-based (Drucker, 1998). Consequently, the increasing number of individuals seeking to further their education is no longer constrained by the traditional structure of higher education and many pursue their objectives with the aid of new technologies.

In response to the increased demand for knowledge and lifelong learning, institutions of higher education have launched programs of adult and continuing education that have incorporated new technology and reshaped the field of distance education. As a result, the application of adult learning theory to the new educational environment shaped by an influx of adult students and technology is a way to guarantee the quality of the educational experience.

This research was conducted to determine the learning style preferences of adult students enrolled in Bowling Green State University's (BGSU) Bachelor of Science in Technology program with a major in Advanced Technological Education (ATE). The core courses of the ATE program are taught by faculty of the College of Technology using synchronous learning environments(SLE) under the joint administration of Continuing Education, International, and Summer Programs, and the Department of Visual Communication and Technology Education.

This study investigated adult learners' learning styles and their reported preference for teaching strategies in a synchronous distance learning environment for adult students at BGSU. Its aim is to aid instructors in improving the efficacy of instruction in this environment via the utilization of learning styles as a frame of reference guiding the design of instruction.

The significance of the present study is in verifying the characteristics of adult learners engaged in a synchronous nontraditional learning environment, given two basic premises. First, the increasing number of adult students seeking higher education heralds a period of greater demand for access to education. The National Center for Educational Statistics (1997) predicted that by the year 2000, 60% of post-secondary students would be working adults over 30 years of age, studying part time.

Second, these students would be taking advantage of the diversity of distance education offerings in higher education in order to reduce unpleasant educational experiences.

> One of the chief complaints returning students have about graduate and professional programs is that they're set up in ways that virtually guarantee students will not be treated like full-fledged adults -- regardless of whether they are twenty-two years old or twice that age. (Glassner, 1994, p. 176)

Therefore, this study intends to assist with the identification of the instructional needs and concerns of an increasingly large segment of the student population in relation to its educational environment of choice. This way, it is expected that college officials and faculty members will gain a better understanding of these students and will be better prepared to provide the educational experiences they seek.

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Review of Literature

The theoretical foundation of this study rests on three bodies of knowledge: adult education, distance education, and learning styles. Andragogy, as a fundamental theory of adult education, was initially conceptualized by Knowles (1980) as "the art and science of helping adults learn" (p. 43) in contrast to pedagogy, or the "art and science of teaching children" (p. 43). This fundamental model of adult education was based on the learner in terms of his or her need to know, self-concept, the role of the learner's experience, readiness to learn, orientation to learning, and motivation (Knowles, 1973/1990, 1980). The application of the andragogical model in the education of children generated enough feedback to force a correction to the original proposition. Knowles (1984) redefined andragogy as no longer antithetical to pedagogy, but rather parallel to it. The application of each depended now on the instructional situation and no longer on the learner's age.

Additionally, the andragogical model implied a process made up of seven basic elements: climate setting, mutual planning, diagnosis of educational needs, formulation of educational objectives, and the learner involvement in the design, conduction, and evaluation of the learning experience (Knowles, 1973/1990, 1980). Fundamental in this process was the recognition of the learner's individual characteristics and how they influenced the learner's performance during the educational experience.

Many of the ideas expressed by Knowles in the formulation of the andragogical model are common to those expressed in self-directed learning (Houle, 1961; Knowles, 1975; Tough, 1979). Together, they characterize adult learning as student-centered, taking into account the learner's previous experiences, where the role of the teacher is to facilitate the educational process.

The qualification of SLE's and adult learners is a key element in understanding this study. Distance education at BGSU was developed based on the convergence of two or more classrooms where instruction was delivered through two-way compressed videoconference technology. Therefore, SLE's refer to distance education delivery through this technology. Accordingly, the example in the literature that best fits the SLE created at BGSU was provided by Simonson and Schlosser (1995) in their description of the Iowa Communications Network. The authors described distance education as the "formal, institutionally based educational activities where the teacher and learner are normally separated from each other in location but not normally separated in time, and where two-way interactive telecommunication systems are used for sharing video, data, and voice instruction" (p. 13).

The definition of an adult student based solely on an individual's age was no longer functional. For the purposes of this study, an adult student or learner was defined as one

> who has experienced a break in the formal educational process; who, while attending college part- or full-time, also works part- or full-time to provide primary support for self and/or others; has established primary residence other than with the primary caregivers during the high school years; or has assumed primary life roles other than that of student (Hoff, 1997, p. 58).

Research in distance education has identified no significant difference in the effectiveness of the traditional and the distance learning environments (Miller & Clouse, 1994; Musial & Kampmueller, 1996; Russell, 1998; & Whittington, 1987). Therefore, the difference to be accounted for rests on the learners' perception of the effectiveness of the learning environment in meeting their educational needs. This perception can be affected by a variety of factors that may be better understood through knowledge about individual differences. For this purpose, the investigation of individual learning styles may reveal key factors in the design of instruction that will have a positive impact on the learning environment and on the learner. Research on learning styles was based on knowledge of the social, physiological, and psychological aspects of the educational process. Accordingly, many different models of learning styles were developed and their respective instruments used to measure their constructs.

For the purposes of this study, learning styles were defined as a "biologically and developmentally imposed set of personal characteristics that make the same teaching method effective for some and ineffective for others" (Dunn, Beaudry, & Klavas, 1989, p. 50). This model postulated the accommodation of individual learning preferences, resulting in greater academic achievement and improved learner attitude (Dunn, Griggs, Olson, Beasley, & Gorman, 1995).

Research Questions

The questions guiding this research study were: (1) What is the correlation between learning styles, as assessed by the Dunn, Dunn, and Price's (1992) Productivity Environmental Preferences Survey (PEPS) and students' preference for a teaching strategy, as measured by the Renzulli and Smith (1978) Learning Styles Inventory (LSI), in

a synchronous learning environment? And (2) What are the correlations among the teaching strategies applied in a synchronous learning environment, as assessed by the Renzulli and Smith (1978) LSI?

Limitations

The limitations identified in the present study concern the generalization of the results to educational environments using similar instructional technology. Also, findings may only be applicable to similar demographics.

The population of this research study was the intact ATE cohorts enrolled in the spring semester, 1999. As a requirement for joining the ATE program, students were asked to provide proof of completion of an Associate Degree with a technical concentration and a minimum of five years work experience. As part of the ATE program, all cohort groups are offered a core curriculum made up of 11 classes that are delivered by videoconferencing technology. For other degree requirements, students utilize local Community Colleges and transfer the respective credits to the ATE degree. The cohort groups involved in this study had completed a different number of core classes and one of the cohorts had completed all the 11 core classes delivered by distance.

A response rate of 70% was obtained from this study. Descriptive statistics were used to report measures of central tendency regarding preferences for learning styles, teaching strategies, and demographics. The Pearson's Product-Moment Correlation was used to draw inferences regarding the relationships among students' preferences for instructional strategies and learning styles. Useful correlations were determined by analyzing correlation coefficients for their statistical significance. An initial level of confidence of 95% was set for all calculations.

All students reported attending classes on a part-time basis. Demographic information obtained from respondents regardless of the location of the remote sites indicated that a typical ATE student is almost 39 years of age, with about 20 years work experience, who has attended a little more than five classes. Major findings included the identification of environmental preferences, Table 1, such as proper illumination, adequate temperature, and formal design; emotional preferences, such as motivation, persistence, and need for structured assignments; sociological preferences, such as learning with peers, with the support of an authority figure, and in different ways; and physical preferences, such as auditory, visual, tactile; need for food intake, time of the day, and mobility.

Table 1. PEPS Results

Preference	40 or lower	Between 40 and 60	60 or more
Environmental			
Sound	-	90.7	9.3
Light*	7.4	79.6	13.0
Warmth*	7.4	77.8	14.8
Design*	9.3	77.8	13.0
Emotional			
Motivation*	1.9	87.0	11.1
Persistence*	-	88.9	11.1
Responsible	9.3	85.2	5.6
Structure*	1.9	53.7	44.4
Sociological			
Alone/Peers*	9.3	61.1	29.6
Authority*	1.9	81.5	16.7
Several Ways *	16.7	75.9	3.7
Physical			
Auditory*	5.6	66.7	27.8
Visual*	22.2	75.9	1.9
Tactile*	3.7	64.8	31.5
Kinesthetic	-	92.6	7.4
Intake*	9.3	61.1	29.6
Evening/Morning*	5.6	79.6	14.8
Late Morning*	9.3	77.8	13.0
Afternoon*	3.7	74.1	22.2
Mobility*	7.4	75.9	16.7

Note: * meaningful preferences

Preferred teaching techniques are reported in Table 2. To determine preference for a teaching technique, every score that averaged 3.0 or higher on the LSI was considered as an indication of preference for the technique. The number of subjects that indicated preference for a teaching technique is presented in the Table as well as the respective percentage of the sample. Percentages may not add up to 100% since subjects may have indicated preference for more than one teaching technique.

Overall, discussion (69%), peer teaching (43%), and independent study (41%) were the top three ranked instructional techniques identified by the students. Lecture (39%) was ranked fourth as a preferred teaching strategy and the technique that showed, percentage-wise, the greatest gender difference percentage-wise. Additionally, one-half of the female students' indicated preference for learning through lecture, against 30% of the male students.
The analysis examined the relationship between modes of instruction and learning style preferences for n = 54 subjects. The correlations between pairs of variables are reported in Table 3. Statistically significant correlations are indicated in the Table, based on number of subjects. At the one percent level, a Pearson correlation of .354 is needed; whereas at the five percent level, a Pearson correlation of .273 is needed. Both critical values represent levels of significance for a two-tailed test.

Table 2. Preferred Teaching Techniques

Modes of Instruction	Females n (%)	Males n (%)	Total n (%)
Projects	7 (29%)	9 (30%)	16 (30%)
Independent Study	8 (33%)	14 (47%)	22 (41%)
Drill & Recitation	3 (13%)	5 (16%)	8 (15%)
Discussion	16 (67%)	21 (70%)	37 (69%)
Lecture	12 (50%)	9 (30%)	21 (39%)
Programmed Instruction	6 (25%)	5 (16%)	11 (20%)
Simulation	4 (16%)	3 (10%)	7 (13%)
Peer Teaching	11 (45%)	12 (40%)	23 (43%)
Games	7 (29%)	4 (13%)	11 (20%)

The findings were presented in the previous chapter. Interpretations and conclusions regarding them are presented in this section. They are organized according to the research questions guiding this study.

First, conclusions regarding the correlation between learning styles, as assessed by the Dunn, Dunn, and Price's (1992) PEPS, and students' preference for a teaching strategy in a synchronous learning environment are addressed. Second, this section addresses correlations among the teaching strategies applied in a synchronous learning environment, as assessed by the Renzulli and Smith (1978) LSI.

Students' preferences for room temperature, amount of light, and the formality or informality in the design of the learning environment are important variables having an impact on their learning. Reflecting on the correlation of these learning style preferences and instructional strategies yields the following recommendations: Instructors should take into consideration the provision of adequate air-conditioning and ventilation when implementing discussion sessions. The use of cool colors in the instructional materials is also desirable. Instructors should also consider the provision of adequate warmth and/or enclosures to students engaging in programmed instruction activities. The use of instructional materials with texture and warm colors should be a consideration when engaging students in programmed instruction.

Even though light and the formality in the design of the learning activity were concerns regarding students' immediate environment, they were not significantly related with any instructional strategy. Therefore, instructors should take these preferences into consideration in the broader context of students' overall needs, levels of comfort, and satisfaction with the learning environment and make sure that adequate light is provided and that the overall arrangement of the room and its furniture are comfortable.

Further considerations regarding students' immediate environment and instructional strategies related to sound. Analysis of the correlation of sound with preference for discussion and lecture indicate that students may be easily distracted by environmental noise when engaging in these activities.

As far as the emotional variables were concerned, students preferred structured environments. Accommodating these variables into the arrangement of learning environments means providing precise instructions about every aspect of the assignments, leaving little room for interpretation.

Further analysis pointing to lecture does not warrant the recommendation of this instructional strategy. First, the significant correlation of lecture with the need for structure reveals that the variation in the need for

structure accounts for 9% of the variation in preference for lecture. Second, it only appealed to 39% of the subjects in the sample. So, it is advisable that instructors first consider other factors before resorting to lecturing.

As stated earlier, seeking greater precision in the statement of objectives and guidelines for the successful completion of assignments may be a viable way of providing students the structure they need. Also, it is yet to be determined if preference for lectures is caused by students' familiarity with this technique or some other factor. This statement is reinforced by analyses of students' sociological preferences, which indicated the utilization of known patterns and routines as a desirable feature in the learning episode.

There was preference for learning with peers using known patterns and routines. This technique appealed to 43% of the subjects in the sample, and indicated good acceptance of small group training techniques. To increase flexibility in the use of instructional techniques, thus satisfying students' sociological preferences, instructors could utilize simulations and peer-teaching activities for the SLE.

Concurrently, instructors should provide opportunities for those learners who prefer to work individually instead of in teams. One possibility involves activities that may be completed either independently or cooperatively.

Table 3. Correlation of Learning Styles and Modes of Instruction

	Projects	Indepent Study	Drill & Recitation	Discussion	Lecture	Programmed Instruction	Simulation
Sound	-0.07	0.05	-0.13	-0.39**	-0.33*	-0.19	-0.22
Light	-0.07	-0.10	-0.15	0.17	-0.01	-0.11	0.12
Warmth	0.14	0.12	0.20	-0.27*	0.18	0.38**	0.01
Design	0.11	0.17	0.14	0.13	0.21	0.20	0.04
Motivation	-0.06	0.05	0.004	0.21	0.18	-0.06	0.15
Persistence	-0.04	-0.03	-0.10	0.01	0.16	0.06	0.04
Responsible	0.01	-0.04	0.20	0.23	0.13	-0.02	0.27*
Structure	0.26	0.12	0.23	0.14	0.31*	0.19	0.05
Alone/Peers	0.26	-0.52*	0.003	0.25	-0.16	0.04	0.48**
Authority	0.09	-0.28*	-0.16	-0.04	0.07	0.03	0.05
Several Ways	-0.28*	0.32*	0.02	-0.13	0.08	-0.17	-0.26
Auditory	0.20	-0.17	-0.14	0.20	0.09	0.13	0.22
Visual	0.17	0.38**	0.25	-0.04	0.19	0.24	-0.04
Tactile	-0.08	0.03	-0.01	0.22	0.02	-0.17	-0.04
Kinesthetic	-0.04	-0.25	-0.24	-0.11	-0.02	-0.07	0.03
Intake	0.04	-0.30*	-0.09	-0.04	-0.36**	-0.15	-0.02
Evening/ Morning	0.07	0.13	-0.02	-0.05	0.30*	0.29*	0.17
Late Morning	-0.15	-0.01	-0.29*	-0.08	0.05	-0.07	-0.05
Afternoon	0.06	-0.12	0.11	0.06	-0.24	-0.02	0.02
Mobility	-0.11	-0.30*	-0.23	0.13	0.02	-0.08	0.13

Note. * $p < .05$ ** $p < .01$

Learners' perceptual preferences included auditory and tactile act ivities, but rejected visual and kinesthetic ones. As far as auditory preferences were concerned, their positive correlation with the use of peer teaching pointed toward students who preferred to work cooperatively and required precise oral directions to understand, perform, and evaluate assignments. Tactile preferences should be taken into consideration regarding the broader context of students' overall needs and levels of comfort and satisfaction with the learning environment. About 17% of the students indicated preference for the use of objects and other manipulative materials while engaging in learning. A well-balanced use of other multisensory resources, coupled with allowing students to first read and take notes before listening to lectures seem to be a more appropriate course of action (Price, 1996).

At least 22% of the students indicated preference to learn through sensory stimuli other than visual. Additionally, visual preference was significantly correlated only with independent study. Hence, effective

instructional strategies to satisfy these preferences point toward instructors allowing students to read the material only after listening and taking notes.

Students' scores demonstrated lack of preference for kinesthetic activities. This fact is reinforced by the lack of significant correlation between this preference and any instructional technique. In turn, the assignment of such activities as readings, television, and real-life experiences is recommended. Additionally, the lack of preference for kinesthetic activities reinforces the utilization of other perceptual preferences instead. However, the result concerning preference for kinesthetic activities seems to contradict instructors' anecdotal data collected when such activities were implemented. This disparity justifies further investigation regarding the results obtained in this study.

According to approximately 22% of the students, the time of the day when they have the most energy and would be the most apt to engage in learning activities was in the afternoon. Even though scheduling class delivery in the afternoon within the present configuration of the ATE program seems unfeasible, it may become a viable alternative for the growth of this program. Provided there was a significant demand for this course and the adoption of technological hardware that incorporated desktop videoconferencing, this program could be marketed to employed adults, and negotiated to reflect the educational needs of a portion of the workforce that has access to such technology. Another benefit of scheduling classes in the afternoon, in conjunction with working hours, is the generation of additional time that adults could spend in their other life roles. However, the successful implementation of this recommendation depends on the culture of students' workplaces and whether management would support flexible work hours.

There was a marked need for intake and mobility during the instructional event. Additionally, both preferences correlate negatively with the preference for independent study. In turn, when utilizing this instructional technique, instructors do not need to worry about planning for the satisfaction of these needs. Given the nature of the technique, the satisfaction of these physical preferences should be left to students' own discretion, an added bonus to instructors at a remote site.

As far as learners' perceptions of the effectiveness of the teaching strategies applied in a synchronous environment are concerned, three of the nine teaching strategies assessed obtained an approval rate of 40% or more. Recommendations regarding the use of discussion, preferred by 69% of subjects; peer teaching, preferred by 43% of subjects; and independent study, preferred by 41% of the subjects are made. Also, some considerations regarding the utilization of lectures are made, given its overall 39% preference rate and its 50% preference rate among women.

The use of discussion as an instructional technique may take many forms. Perhaps, Seaman and Fellenz (1989) may better explain the most significant aspect of identifying discussion as a preferred teaching strategy to be used in SLE. These authors have stated that this technique complements preference for learning with peers and

> for having a degree of control over the learning situation. Interaction and sharing among participants are stimulated by discussion strategies that allow students to work in groups and to interact not only with the materials but also with their peers. Because the teacher does not control discussions, students are able to manage their own learning and direct it to their needs and interests. (p. 120)

Consistent with this statement is the fact that the variation in the scores of discussion accounts for almost 17% of the variation in the scores of preferences for drill and recitation. It also accounts for approximately 10% of the variation in the scores for simulation as a preferred instructional strategy.

The use of discussion as an instructional technique is recommended. Additionally, this recommendation corroborates Knowles' (1980) identification of discussion as one of the instructional techniques "available to help adults learn" (p. 239). According to Knowles, book-based discussion, case discussion, group discussion, guided discussion, problem-solving discussion, and Socratic discussions are specific examples of discussion techniques accessible to instructors facilitating adult education.

The relationship between discussion and drill and recitation is easy to explain. Defined for the purposes of this study as a teaching strategy that "involves a teacher asking questions and calling on students to respond with appropriate information" (Renzulli, Smith, & Rizza, 1998, p. 2), drill and recitation may be an effective way of initiating a large group discussion. According to Ostendorf (1997), "it is far better to kick off a discussion by calling on a particular person or a particular site and asking for ideas, comments, or questions" (p. 57). Therefore, drill and recitation may be an instructional strategy that, if used skillfully and in combination with discussion, may be recommended as a set-inducting instructional technique for SLE.

To a lesser extent, a similar case may be made for the recommendation of simulations as an auxiliary instructional technique in SLE. Knowles (1980) listed different simulation techniques that could be used in the instruction of adults, and further suggested their use to be best suited to the specific behavioral outcomes. Once again, the effective application of the technique in a SLE will depend on its facilitation.

The suggestion of peer teaching as an effective teaching strategy in SLE can be looked at from its relationship with simulation. Since the variation in the scores for simulation accounted for approximately (a) 17% of

the variation in scores for peer teaching and (b) 26% of the variation in scores for games, the recommendation of peer teaching is based on its property of reinforcing students' sociological preferences.

Moreover, the use of peer teaching as an instructional technique in SLE reinforces adult students' self-concepts and recognizes the value of their previous experiences to the learning process. By making use of students' experiences and allowing them the opportunity to share their knowledge with their peers, instructors will be strengthening students' motivation to learn and reinforcing their self-identity.

Independent study was the preferred teaching strategy for 41% of subjects. It is also a recommended instructional strategy to be used in SLE. Its recommendation reinforces theoretical postulates concerning self-directed learning, which maintains that students should take primary responsibility for planning, executing and evaluating their learning experiences (Merriam & Caffarella, 1991).

By designing SLE where students take responsibility for the plan, execution, and evaluation of their learning experiences instructors will be putting the andragogical model in practice. Learning contracts may be helpful as a tool assisting in the implementation of instructional activities that attend to student preference for taking responsibility for their learning experiences.

Variation in the scores for independent study accounted for 18% of the variation in the scores for lecture. For the purposes of this study, lecture was defined as a verbal presentation by a teacher or expert, with little interaction between lecturer and audience (Renzulli, Smith, & Rizza, 1998, p. 2). Moreover, half the female students in the sample selected it as a preferred teaching strategy and Knowles (1980) listed it as a possible presentation technique. However, its recommendation as a preferred teaching strategy to be utilized in SLE cannot be made without disregard to some precautions.

When designing instructional activities for a SLE, instructors should be cognizant of the possibly negative effects of this strategy. From an instructor's standpoint, a lecture is a relatively simple activity to plan and deliver, but not an easy one to learn from, especially in a SLE. Long lectures should not be used in this environment because they contribute to the "talking head" effect, which has been identified as an undesirable trait of the SLE.

As in all educational activities, effectiveness cannot be achieved at the expense of thoughtful preparation and experience. Skillful facilitation and instructional design take into consideration not only the appropriateness of an instructional strategy in relation to the content to be explored. However, learners' characteristics are the cornerstone of any successful educational experience.

SLE instructors operate in a unique environment that requires unique solutions. Understanding the application of students' learning style preferences in the design of instruction responsive to students' individual needs may provide instructors with the guidelines to the solutions they seek. Additionally, by providing adult students with educational environments catering to their needs, instructors of distance education will be assisting an increasingly larger portion of the population in accomplishing their objectives regarding lifelong learning and self-actualization.

Results and conclusions reported in this study could be validated by further research. Even though this is not an exhaustive list, topics for further research include the investigation of: (a) other factors in the relationship between learning style preferences and preference for instructional strategies as follow-up using qualitative methods; (b) the significance of learners' previous experiences with the instructional techniques utilized in a SLE in determining preference for given teaching strategies; (c) the variance of learning style preferences when learners pursue other majors such as Business, Accounting, Mathematics, Microbiology, and Humanities in a SLE; and (d) differences between adult and traditional-aged students involved in SLE regarding their learning styles and preferences for teaching strategies.

References

Drucker, P. F. (1998). Managing in the network society. In P. F. Drucker (Ed.), Managing in a time of great change (pp. 65-72). New York: Truman Talley Books/Dutton.

Dunn, R. S., Beaudry, J. S., & Klavas, A. (1989). Survey of research on learning styles. Educational Leadership, 46 (6), 50-58.

Dunn, R. S., Dunn, K., & Price, G. E. (1992). Productivity environmental preferences survey (PEPS). Lawrence, KS: Price Systems

Dunn, R. S., Griggs, S. A., Olson, J., Beasley, M., & Gorman, B. (1995). A meta-analytic validation of the Dunn and Dunn model of learning style preferences. The Journal of Educational Research, 88 (6), 355-362.

Glassner, B. (1994). Career crash: America's new crisis -- and who survives. New York: Simon & Schuster.

Hoff, K. S. (1997). Emerging career development needs as reported by adult students at four Ohio institutions of higher education: A qualitative study. (Doctoral dissertation, Bowling Green State University, 1997). Dissertation Abstracts International, AAT9804303.

Houle, C. O. (1961). The inquiring mind. Madison, WI: University of Wisconsin Press.

Knowles, M. S. (1973/1990). The adult learner: A neglected species (4th ed.). Houston, TX: Gulf.

Knowles, M. S. (1975). Self-directed learning: A guide for learners and teachers. New York: Association Press.

Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy (2nd ed.). Chicago, IL: Association Press.

Knowles, M. S. (1984). Andragogy in action: Applying modern principles of adult learning. San Francisco: Jossey-Bass.

Merriam, S. B., & Caffarella, R. S. (1991). Learning in adulthood. San Francisco: Jossey-Bass.

Miller, C. D., & Clouse, R. W. (1994). Technology-based distance education: Present and future directions in business and education. Journal of Educational Technology Systems, 22 (3), 191-204.

Musial, G. G., & Kampmueller, W. (1996). Two-way video distance education: Ten misconceptions about teaching and learning via interactive television. Action in Teacher Education, 17, 4, 28-36.

National Center for Educational Statistics. (1997). Distance education in higher education institutions. [Online document]. <URL:http://www.ed.gov/NCES/pubs98/distance/index.html>. Washington, DC: Author.

Ostendorf, V. A. (1997). Teaching by television. In T. E. Cyrs (Ed.), Teaching and learning at a distance: What it takes to effectively design, deliver and evaluate programs. New Directions for Teaching and Learning, 71, 51-58.

Price, G. E. (1996). Productivity environmental preference survey manual. Lawrence, KS: Price Systems.

Renzulli, J. S., & Smith, L. H. (1978). Learning styles inventory: A measure of student preference for instructional techniques. Mansfield Center, CT: Creative Learning.

Renzulli, J. S., Smith, L. H., & Rizza, M. G. (1998). Learning styles inventory. Mansfield Center, CT: Creative Learning.

Russell, T. L. (Ed.) (1998). The 'no significant difference" phenomenon as reported in 355 research reports, summaries, and papers (5th ed.). (Available from the Office of Instructional Telecommunications, North Carolina State University, Campus Box 7401, NC 27695).

Seaman, D. F., & Fellenz, R. A. (1989). Effective strategies for teaching adults. Columbus, OH: Merrill.

Simonson, M., & Schlosser, C. (1995). More than fiber: Distance education in Iowa. Techtrends, 40 (5), 13-15.

Tough, A. (1979). The adult's learning process. Toronto: Ontario Institute for Studies in Education.

Whittington, N. (1987). Is instructional television educationally effective? A research review. The American Journal of Distance Education, 1, 47-57.

The Influence of Learning Style Preferences on Student Success in Online vs. Face-to-Face Environments

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This study compared the relationship between learning style preferences and learner success of students in an online course with an equivalent face-to-face course. Comparisons included motivation maintenance, task engagement, and cognitive controls. Results revealed significant relationships between preferences and course success on five constructs for the face-to-face students and no significant relationships for the online students. Overall, the findings suggest that students can be equally successful in face-to-face and online environments regardless of learning style preferences.

Keywords: Online Instruction, Learning Styles, Student Outcomes

Whether learning takes place in an institution of higher education or in a private, public, or non-profit organization, participants are expected to learn and subsequently apply their new knowledge. During recent years, innovations in higher education have served as a catalyst for changing relationships among students and teachers (Dziuban & Dziuban, 1997). New advances in Internet-based technology have brought challenges and opportunities to education and training, in particular through online instruction. Online instruction is a form of distance education delivered over the Internet. For many, this type of instruction is perceived as a major breakthrough in teaching and learning because it facilitates the exchange of information and expertise while providing opportunities for learners in distant of disadvantaged locations (Webster & Hackey, 1997).

While online instruction is gaining popularity, it is not free fro m criticism. Many educators and trainers do not support online instruction because they do not believe it actually solves difficult teaching and learning problems (Conlon, 1997) while others are concerned about the many barriers that hinder effective online teaching and learning. These concerns include the changing nature of technology, the complexity of networked systems, the lack of stability in online learning environments, and the limited understanding of how much students and instructors need to know to successfully participate (Brandt, 1996). Online instruction also threatens to commercialize education, isolate students and faculty, and may reduce standards or even devalue university degrees (Gallick, 1998). While these concerns may be unwarranted, there is little research to accurately determine the benefits and pitfalls of online instruction, particularly when compared to the more traditional face-to-face learning environment. Researchers and educators are unsure how students' online experiences differ from their experiences in face-to-face learning environments. Gaining knowledge about the processes and outcomes of online instruction as compared to traditional face-to-face environments will help educators and researchers make more informed decisions about future online course development and implementation.

Problem Statement and Purpose

Although the growth of online programs has been significant in recent years, the capabilities and efficacy of such programs have yet to be fully investigated. According to Hill (1997), online instruction is viewed as a viable option for all types of learners and as a potentially revolutionary resource tool. However, most effort in this area has been devoted to program development while examinations of program quality and effectiveness have been anecdotal in nature (Johnson, Aragon, Shaik, & Palma-Rivas, in press). With little empirical knowledge about Internet-based education outcomes, the need for research in this area is not only timely, but also imperative. An emerging issue in higher education is the use of learning styles research to create more positive, effective learning environments for all students.

The primary purpose of this exploratory empirical study was to examine the relationship of learning style preferences on learning success of students enrolled in an online course with those enrolled in an equivalent course

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taught in a traditional face-to-face format. Comparisons included the environmental factors that maintain student motivation in the classroom, task engagement strategies, and cognitive processing habits (cognitive controls).

While attempts have been made to compare online and face-to-face learning environments, they are often discounted due to the great dissimilarity between the two learning environments. This is a classic example of comparing apples to oranges. According to Johnson, Aragon, Shaik, and Palma-Rivas (in press), "studies of this type should not attempt to determine if one fruit is better than the other, instead, they should demonstrate that, if grown properly, different fruits can be equal in terms of taste and nutritional value." This study is an attempt to determine if properly designed environments that differ on many characteristics can lead to learning success regardless of student learning style preferences. Studies of this type are also important because many faculty who are being asked to design and teach Internet-based courses are wondering if all students can actually be successful in these new online environments. As the evidence mounts in support of the effectiveness of online learning environments, educational research can tackle the more fundamental question of how to optimize instructional designs to maximize learning opportunities and achievement in both the online and face-to-face environments.

Research Questions

This study was designed to answer the following research question.

1. Is there a distinguishable difference in the learning style preferences of students as controlled by the delivery format?
2. How do student outcomes vary across learning style preferences as controlled by the delivery format?
   2a. Do learning style constructs exist that significantly influence student outcomes regardless of delivery format?
   2b. Do learning style constructs exist that significantly influence student outcomes in both the online and face-to-face delivery formats?

Theoretical Framework

A major limitation of the existing learning style theories and models is that the primary focus is on information processing or cognitive habits. Therefore a more comprehensive theory of learning style was sought to guide the study. Curry's (1991) Theoretical Model of Learning Style Components and Effects was selected. Curry submits that specific information processing habits is only one factor that influences learning styles and/or successful learning. She posits that in order to adequately design educational programs that lead to successful learning the constructs of motivation maintenance and task engagement must also be considered.

According to Curry (1991), motivational levels are maintained once the learner establishes preferred environmental and social conditions for learning. Factors contributing to motivation include a general sense of self-efficacy and self-control. The engagement level is defined as "the point of contact between the motivational condition of the learner entering the learning situation and the active processing work required by the new learning task" (Curry, 1991, p. 251). A learner's level of task engagement is reflected in the amount of attention that is paid to features in the instructional situation, how persistent the learner will be, the degree of participation, the enthusiasm, and degree of concentration the learner sustains throughout and beyond the instructional situation. Cognitive controls refer to the information processing habits or control systems that learners bring to learning situations. According to Curry, these cognitive controls take place only after the learner becomes engage in the task.

Method

Instructional Context

Data were collected from two sections of a graduate level instructional design course for human resource development professionals. One version of the course was taught on the campus of a large Midwestern university through traditional a face-to-face format while the other version of the same course was offered totally online, with no direct face-to-face contact between the instructor and the students. Both courses were taught by the same instructor, delivered by the same department, and required the same content, activities, and projects. The instructional treatment of each topic followed the same organization.

Subjects

This exploratory empirical study compared outcome data obtained from students enrolled in one of two versions of a graduate level instructional design course for human resource development professionals. Nineteen

students, most of whom are pursuing a graduate degree in HRD, were enrolled in the on-campus course. These students can be viewed as traditional university students who are actively pursuing an advanced degree through full time study on campus. Nineteen students were also enrolled in the online version of the course. These students are also pursuing a graduate degree in HRD through a degree program that is taught completely online. The online group can be viewed as nontraditional students because they are able to complete their advanced degree without ever setting foot on campus.

An important consideration for this type of comparison study is the equivalence of the groups prior to the start of instruction. Official university student records were reviewed to obtain a variety of demographic and academic data for comparison. The slight differences between the two groups in age, the year they received their baccalaureate degree, undergraduate GPA, and years of work experience were non-significant (see Johnson, Aragon, Shaik, and Palma-Rivas, in press). In addition to these general demographic comparisons, the students were asked to respond to three questions regarding their degree of prior training and experience in the instructional design area. The results of this short questionnaire revealed that both groups of students had very little formal experience in instructional design prior to enrolling in this course. Because the majority of the online group was working full time while they completed the instructional design course, a few of them did have opportunities to design training courses as a part of their jobs. Four of the face-to-face students and eleven of the online students had previous experience designing courses. Of this experience, the majority of the students indicated they had designed two or fewer courses that were less than one-half day in length. Although several online students had prior experience designing courses, only three of them indicated they had formal training in the instructional design process; one as part of his undergraduate coursework and the other two through a 3-day seminar. Three students in the face-to-face group had also indicated previous instructional design training through university courses and workshops.

Instrumentation

Three learning style instruments were selected to measure each one of the learning constructs. These instruments were selected based on Curry's (1991) previous analyses of psychometric evidence showing that each had acceptable levels of internal and temporal reliability as well as construct and predictive validity.

The Grasha and Reichmann *Student Learning Style Scale* (Riechmann & Grasha, 1974) was used to assess motivation maintenance. The SLSS consists of 90 self-report items. A 5-point Likert-type scale describes the learner along the bipolar scale dimensions of independent vs. dependent, avoidant vs. participant, and collaborative vs. competitive. Task engagement was assessed by the Weinstein, Palmer, and Schulte (1987) *Learning and Study Strategies Inventory*. The LASSI contains 83 items. Subjects are asked to respond to the items on a five-point Likert scale. The items are sorted to ten variables including anxiety, attitude, concentration, information processing, motivation, scheduling, selecting the main idea, self-testing, study aides, and test strategies. Finally, cognitive control functions were assessed through the Kolb (1985) *Learning Style Inventory*. The LSI was developed around Kolb's experiential learning model. The LSI contains 12 sentence stems, each having four sub-items to be rank ordered. Responses are organized into two bipolar concepts: concrete experience vs. reflective observation, and abstract conceptualization vs. active experiementation.

Procedures

All date were collected near the end of the semester as part of a discussion and activity on learning styles. All students completed paper versions of all three instruments. The online students received and returned the instruments through the mail. The face-to-face students completed and returned their instruments during a class session. All instrument data were entered into a statistical analysis package for later analysis. Statistical analyses were conducted using independent *t*-tests and bivariate correlation analysis. All statistical tests reported in this paper were conducted with a significance level of .05. The search for distinguishable relationships in student outcomes (i.e., content knowledge and quality of course assignments and projects) across learning style preferences was conducted using the final course grades that were assigned to each student by the instructor.

Results

Learning Style Differences

Results of the independent *t*-tests indicate no significant differences in the social and environmental preferences between the students of the two delivery formats. Table 1 presents these results. Table 2 reveals that both the face-to-face and online students are also comparable in their learning and study strategies with the exception of "study aids." This particular subscale assesses how effective students are at using support techniques and materials above and beyond those required by the course. This result indicates that the face-to-face students

reports greater use of such techniques and materials (M = 30.17, SD = 4.76), t(34) = 4.10, p < .05. Finally, Table 3 reveals significant differences in the cognitive processing habits of the two student groups. Reflective observation measures the extent to which students learn by watching and doing. The mean difference on this subscale was significant (M = 30.53, SD = 8.57), t(35) = 2.18, p < .05, indicating that the face-to-face students are more reflective in comparison to their online counterparts. In addition, the face-to-face students report a higher degree of learning by thinking (abstract conceptualization) in comparison to the online students (M = 34.74, SD = 5.67), t(35) = 2.11, p < .05. Finally, significant differences were found on the active experimentation scale, which assesses the extent to which students learn by doing. In this case, the online students report greater use of this mode of learning (M = 36.11, SD = 8.46), t(35) = -2.54, p < .05.

Table 1
Independent t-test - Student Learning Style Scales (Group 1 – Face-to-face; Group 2 – Online)

Subscale	Format	N	Mean	SD	t (dof)	p
Independent	Group 1	19	37.21	3.55	0.54 (35)	0.58
	Group 2	18	36.44	4.90		
Dependent	Group 1	19	36.79	4.20	0.40 (35)	0.68
	Group 2	18	36.11	5.80		
Avoidant	Group 1	19	21.00	4.61	- 1.15 (35)	0.25
	Group 2	18	23.06	6.18		
Participant	Group 1	19	41.84	5.49	1.18 (35)	0.24
	Group 2	18	38.89	4.40		
Collaborative	Group 1	19	40.58	6.38	1.18 (35)	0.24
	Group 2	18	38.50	3.97		
Competitive	Group 1	19	22.63	5.98	- 0.46 (35)	0.64
	Group 2	18	23.67	7.40		

Table 2
Independent t-test - Learning and Study Strategies Inventory (Group 1 – Face-to-face; Group 2 – Online)

Subscale	Format	N	Mean	SD	t (dof)	p
Attitude	Group 1	18	35.00	4.97	0.00 (34)	1.00
	Group 2	18	35.00	3.45		
Motivation	Group 1	18	34.83	3.93	1.02 (34)	0.31
	Group 2	18	33.33	4.83		
Time Management	Group 1	18	30.50	6.59	1.62 (34)	0.11
	Group 2	18	26.83	6.92		
Anxiety	Group 1	18	29.89	7.55	0.92 (34)	0.36
	Group 2	18	31.72	3.69		
Concentration	Group 1	18	31.00	4.64	1.24 (34)	0.22
	Group 2	18	28.83	5.75		
Information Processing	Group 1	18	32.89	4.78	0.96 (34)	0.34
	Group 2	18	31.33	4.87		
Selecting the Main Idea	Group 1	18	21.33	2.93	0.42 (34)	0.67
	Group 2	18	20.89	3.36		
Study Aids	Group 1	18	30.17	4.76	4.10 (34)	0.00 *
	Group 2	18	23.78	4.58		
Self-Testing	Group 1	18	29.39	4.27	1.55 (34)	0.12
	Group 2	18	26.94	5.13		
Test Strategies	Group 1	18	34.56	3.81	0.23 (34)	0.81
	Group 2	18	34.22	4.53		

** significant at alpha = 0.05 (2-tailed)*

Table 3
Independent t-test - Learning Style Inventory (Group 1 – Face-to-face; Group 2 – Online)

Subscale	Format	N	Mean	SD	t (dof)	p-val
Concrete Experience	Group 1	19	25.00	6.19	- 1.04 (35)	0.27
	Group 2	18	27.61	8.12		
Reflective Observations	Group 1	19	30.53	8.57	2.18 (35)	0.03 *
	Group 2	18	25.22	5.88		
Abstract Conceptualization	Group 1	19	34.74	5.67	2.11 (35)	0.04 *
	Group 2	18	30.44	6.67		
Active Experimentation	Group 1	19	29.16	8.15	- 2.54 (35)	0.01 *
	Group 2	18	36.11	8.46		

* *significant at alpha = 0.05 (2-tailed)*

Learning Style Influence on Student Success

The primary question addressed by this study was to what extent did learning style have on student success when the delivery format was controlled. The data were analyzed by first looking at the relationships between all students and their course grade. A significant positive correlation was found between "motivation" from the task engagement construct and course grade indicating that as student motivation increased so did the course grade. Tables 4, 5, and 6 present the results of these analyses.

Table 4
Bivariate Correlations - Student Learning Style Scales (Face-to-face and online)

Subscale	N	Mean	SD	Corr coeff	p-value
Independent	37	36.84	4.22	- 0.10	0.53
Dependent	37	36.46	4.98	0.24	0.14
Avoidant	37	22.00	5.45	- 0.26	0.12
Participant	37	40.89	5.02	0.30	0.07
Collaborative	37	39.57	5.38	0.01	0.94
Competitive	37	23.14	6.64	- 0.20	0.23

Table 5
Bivariate Correlations – Learning and Study Strategies Inventory (Face-to-face and online)

Subscale	N	Mean	SD	Corr coeff	p-value
Attitude	37	34.97	4.16	0.21	0.21
Motivation	37	33.92	4.46	0.377	0.02 *
Time Management	37	28.68	6.82	0.21	0.20
Anxiety	37	30.70	5.88	0.17	0.30
Concentration	37	29.95	5.20	- 0.05	0.77
Information Processing	37	31.95	4.86	0.15	0.37
Selecting the Main Idea	37	21.08	3.04	0.04	0.80
Study Aids	37	26.95	5.55	0.07	0.64
Self Testing	37	28.00	4.85	0.23	0.16
Test Strategies	37	34.22	4.20	0.26	0.11

* *significant at alpha = 0.05 (2-tailed)*

Table 6
Bivariate Correlations – Learning Style Inventory (Face-to-face and online)

Subscale	N	Mean	SD	Corr coeff	p-value
Concrete Experience	38	26.16	7.15	- 0.06	0.66
Reflective Observation	38	28.05	7.68	0.19	0.25
Abstract Conceptualization	38	32.50	6.45	- 0.16	0.31
Active Experimentation	38	32.71	8.86	- 0.03	0.84

The data were then analyzed using bivariate correlation analysis controlling for the delivery format. Examining the results for the face-to-face students, a total of five significant correlations were found. At the maintenance motivation level, as the level of avoidance of classroom activities decreased, the course grade increased. As student participation in classroom activities increased, the course grade increased. At the task engagement level, positive correlations were found between attitude and course grade as well as time management and course grade. These correlations suggest that as student attitude becomes more positive and the use of time management techniques increase, course grade will increase. Finally, one negative correlation was found for the cognitive controls construct. As abstract conceptualization (learning by thinking) decreased, the final course grade increased. This is the one finding that warrants further investigation. Results of the analyses are found in Tables 7, 8, and 9.

Table 7
Bivariate Correlations – Student Learning Style Scales (Face-to-face)

Subscale	N	Mean	SD	Corr coeff	p-value
Independent	19	37.21	3.55	0.15	0.51
Dependent	19	36.79	4.20	0.19	0.43
Avoidant	19	21.00	4.61	- 0.58	0.00 *
Participant	19	41.84	5.49	0.58	0.00 *
Collaborative	19	40.58	6.38	0.09	0.69
Competitive	19	22.63	5.98	- 0.00	0.99

**significant at alpha = 0.05 (2-tailed)*

Table 8
Bivariate Correlations – Learning and Study Strategies Inventory (Face-to-face)

Subscale	N	Mean	SD	Corr coeff	p-value
Attitude	18	35.00	4.97	0.51	0.02 *
Motivation	18	34.83	3.93	0.43	0.07
Time Management	18	30.50	6.59	0.45	0. 05 *
Anxiety	18	29.89	7.55	0.19	0.44
Concentration	18	31.00	4.64	0.07	0.78
Information Processing	18	32.89	4.78	0.43	0.07
Selecting the Main Idea	18	21.33	2.93	0.26	0.28
Study Aids	18	30.17	4.76	0.32	0.18
Self Testing	18	29.39	4.27	0.24	0.32
Test Strategies	18	34.56	3.81	0.40	0.09

**significant at alpha = 0.05 (2-tailed)*

Table 9
Bivariate Correlations – Learning Style Inventory (Face-to-face)

Subscale	N	Mean	SD	Corr coeff	p-value
Concrete Experience	19	25.00	6.19	- 0.25	0.29
Reflective Observation	19	30.53	8.57	0.31	0.19
Abstract Conceptualization	19	34.74	5.67	- 0.56	0.01 *
Active Experiementation	19	29.16	8.15	- 0.18	0.44

**significant at alpha = 0.05 (2-tailed)*

Finally, the results from the analyses for the online students show no significant relationships between the learning style subscales and the final course grade. These results are presented in Tables 10, 11, and 12.

Table 10
Bivariate Correlations – Student Learning Style Scales (Online)

Subscale	N	Mean	SD	Corr coeff	p-value
Independent	18	36.44	4.90	- 0.29	0.23
Dependent	18	36.11	5.80	0.29	0.24
Avoidant	18	23.06	6.18	- 0.03	0.88
Participant	18	39.89	4.40	- 0.02	0.91
Collaborative	18	38.50	3.97	- 0.10	0.68
Competitive	18	23.67	7.40	- 0.35	0.15

Table 11
Bivariate Correlations – Learning and Study Strategies Inventory (Online)

Subscale	N	Mean	SD	Corr coeff	p-value
Attitude	18	35.00	3.45	0.21	0.38
Motivation	18	33.33	4.83	0.27	0.26
Time Management	18	26.83	6.92	0.06	0.80
Anxiety	18	31.72	3.69	0.05	0.82
Concentration	18	28.83	5.75	- 0.11	0.66
Information Processing	18	31.33	4.87	- 0.22	0.37
Selecting the Main Idea	18	20.89	3.36	- 0.18	0.47
Study Aids	18	23.78	4.58	- 0.07	0.76
Self-Testing	18	26.94	5.13	0.16	0.52
Test Strategies	18	34.22	4.53	0.02	0.90

Table 12
Bivariate Correlations – Learning Style Inventory (Online)

Subscale	N	Mean	SD	Corr coeff	p-value
Concrete Experience	18	27.61	8.12	- 0.00	0.97
Reflective Observation	18	25.22	5.88	0.20	0.41
Abstract Conceptualization	18	30.44	6.67	0.04	0.85
Active Experimentation	18	36.11	8.46	- 0.19	0.43

Conclusions

While both the face-to-face and online students did not vary significantly according to age, year of Baccalaureate graduation, GPA, and experience, they did very significantly in their learning style preferences particularly at the cognitive controls level. As one would expect based on learning theory (Merriam & Caffarella, 1999), these students brought into their respective settings different ways and preferences for learning course content. Obviously, it is these types of differences that, while logical in theory, make designing courses that meet all learning style preferences challenging in practice. The results from the independent t-tests simply reaffirm the proven theory that we all learn differently. Given the differences found between the learning style preferences of these two groups, the results from the bivariate correlation analyses become even more meaningful.

First, even though there were learning style differences found between the face-to-face and online students, the differences were not highly apparent when the delivery format was controlled. Looking at the results from the correlation analysis for all students, motivation was the only variable found to influence course grade. This finding should not be surprising as theory tells us that as motivation increases so does learning (Merriam & Caffarella, 1999). While motivation tends to be an internally driven characteristic, it is also know that external factors such as the teacher, course design, and learning activities can and will influence motivation within the context of learning. The instructor of the course did emphasize this factor strongly as being a factor that greatly influences success in the course. Consequently, this may the explanation as to why there was such a high correlation for this factor. This finding reaffirms the fact that educators, regardless of delivery format, should strive to increase and maintain positive levels of student motivation.

Second, the significant results from the correlation analyses for the face-to-face students also serves to reaffirm what we know contributes to positive learning outcomes for students. As student participation increased and avoidance decreased, grades were shown to increase. Because these two variables significantly influenced student outcomes, it suggests that educators need to continually strive for ways of making learning active and participatory for students. Learning theory has shown that adults gain more from educational experiences when they can be actively engaged. Positive attitudes and increased use of time management techniques influence course grade. These too are logical findings and have been proven in the past (Merriam & Caffarella, 1999). The surprising correlation was the negative one that existed between abstract conceptualization (learning by thinking) and course grade. It may simply be that because the instructional design class is an application, hands-on course, that success is more dependent on participation. As in the case earlier, another logical explanation not only for this finding, but the others found for the face-to-face students is that these particular variables may have been more strongly emphasized in the face-to-face class and revealed themselves within the results of the learning style instruments. Although the instruments are designed to obtain an overall assessment of learning across all experiences, it should be acknowledged that students may have been thinking specifically, or at least more, about their respective instructional design courses.

Finally, what is probably the most exciting finding from this study is the fact that correlations between learning style and course grade were not found for the online students. Consequently, this finding suggests that learners can be just as successful in the online environment regardless of learning style. Granted, it does not mean that "anything goes" but that the online course must be developed well in order for learning to occur. This is true regardless of the format or content of any course. However, at a time when criticisms are still being made against the effectiveness and quality of online instruction, these findings from this study help to negate such statements.

Implications

As we have discussion previously (Johnson, Aragon, Shaik, & Palma-Rivas, in press), the ultimate question for educational research is how to optimize instructional designs to maximize learning opportunities and achievements in both online and face-to-face environments. The findings of this study show that online learning can be as effective as face-to-face learning in many respects in spite of the fact that students have different learning style preferences. In view of these findings, several implications emerge pertaining to future online program development.

First, this analysis suggests that the development and use of online programs should continue. However, it is important that quality and thoroughness of the design and delivery be the catalyst for ensuring positive online learning experiences. It is logical that if these two factors are not at the forefront of any design efforts, learning success may not occur or occur at lower levels. Second, this study suggests that that a continued understanding of adult learning theory and learning styles needs to be emphasized among faculty. This is critical if courses are going to be designed to addresses the various domains of learning. This is especially critical in the online environment where an element of creativity is needed to identify and design educational experiences that can be as active, collaborative, and participatory as those commonly found in the face-to-face environment. Finally, educational practitioners should be aware of their own learning style preferences. We believe this especially true for online learning. As has been shown, the way we learn and the way we were taught will greatly influence the ways we will teach. Knowing our strengths and weaknesses as educators helps us to know where we will be strong and weak in terms of instructional design and delivery. Related to the second point above, designing online instruction that keeps students motivated and active requires thinking outside the box. Unless we know the boundaries of our "boxes," we run the risk of not incorporating all learning preferences found in our students.

References

Brandt, D. S. (1996, February, 27). *Teaching the net: Innovative techniques in Internet training*. Paper presented at the 11th Annual Computers in Business Conference, Washington, DC. (ERIC Document Reproduction Service No. ED 412 975)

Conlon, T. (1997). The Internet is not a panacea. *Scottish Educational Review, 29,* 30-38.

Curry, L. (1991). Patterns of learning style across selected medical specialties. *Educational Psychology, 11,* 247-277.

Dziuban, J. I., & Dziuban, C. D. (1997-98). Reactive behavior patterns in the classroom. *Journal of Staff, Program, and Organization Development, 15,* (2), 85-91.

Gallick, S. (1998). *Technology in higher education: Opportunities and threats*. University of California at Los Angeles, Los Angeles, CA. (ERIC Document Reproduction Service No. ED 415 929)

Hill, J. R. (1997). Distance learning environments via world wide web. In B. H. Khan (Ed.). *Web-based instruction* (pp. 75-80). Englewood Cliffs, NJ: Educational Technology Publications.

Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (in press). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research.*

Kolb, D. A. (1985). *Learning style inventory and technical manual.* Boston: McBer and Company.

Merriam, S. B., & Caffarella, R. S. (1999). *Learning in adulthood: A comprehensive guide* (2nd ed.). San Francisco, CA: Jossey-Bass.

Riechmann, S. W., & Grasha, A. F. (1974). A rational approach to developing and assessing the construct validity of a student learning style scales instrument. *Journal of Psychology, 87,* 213-223.

Webster, J., & Hackley, P. (1997). Teaching effectiveness in technology-mediated distance learning. *The Academy of Management Journal, 40*, 1282-1309.

Weinstein, C. E., Palmer, D. R., & Schulte, A. C. (1987). *LASSI: Learning and study strategies inventory*. Clearwater, FL: H & H Publishing.

The Impact of a Distance-Training System (DTS) with Two Distance Training Delivery Processes (DTDP) On Trainee Satisfaction and Individual Job Performance: A Case Study

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This paper will focus on the multiple regression analysis of a larger research evaluation study. Multiple regression revealed which components of a distance training system were statistically significant in influencing trainee satisfaction and performance outcomes. Implications for human resource development professionals for transfer of training and the use of distance technology in training and instructional design are discussed. Caution in the interpretation of results is important as this is a case study where generalization of findings is limited to this organization.

This paper reports the results of multiple regression analyses for a distance-training system (DTS) to determine which factors influenced trainee satisfaction and job performance. The distance training delivery process (DTDP) was of special interest to determine if it was significant. These results were part of a larger evaluation research study that examined the effects of a DTS with two distinct DTDPs on trainee satisfaction, job performance and organizational outcomes. (See Hruby-Moore (1999) in the *AHRD Proceedings* for the first part of this study.)

Introduction

A DTS is viewed as a human resource development intervention to improve organization performance (Hruby-Moore, 1997). Training, using interactive distance technology, is a recent challenge for HRD professionals. In today's changing work environment, what distance delivery process will results in trainees' satisfaction with their training experience, while providing effective individual and organizational performance outcomes? These general questions guided this exploratory, case study research. By taking a system view, the HRD professionals in this particular organization, developed a second distance training delivery process (DTDP), with videoconferencing.

The focus of this paper is on describing the differences in the two DTDPs studied and the impact of the DTS variable set on trainee satisfaction and job performance. The same basic sales training content was delivered via two different combinations of trainers, methods of instruction, media technologies, and instructional techniques for interaction. The two DTDPs varied in their instructional approaches, yet both achieved similar results in learning outcomes at the individual level. Trainee attributes, the learning context, and the amount of interaction were also measured. The two DTDPs were compared on the differences in course structure (methods, media and techniques) as one major independent variable. The theory of transactional distance (Moore, 1973; 1983) suggests course structure and dialog (interaction) are the two variables that can be manipulated to produce effective training outcomes. Figure 1 shows the independent variable set (trainee attributes, trainee interaction, trainer, training context, and delivery process) and the dependent variables (trainee satisfaction, job performance and retention) viewed from a systems approach, to include inputs, processes, and outcomes of the DTS. Dialog was measured by the number of hours of trainee's interaction with their manager and/or corporate instructor and structure was defined by the type of DTDP. Other variables identify factors cited as influencing trainee satisfaction and performance.

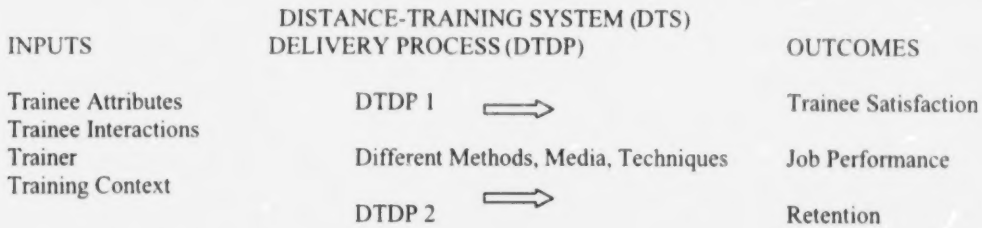

Figure 1: Conceptual Model of a Distance-training System (based on Hruby-Moore, 1997)

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Review of Literature and Theoretical Framework

Human resource development (HRD) is concerned with improving an organization's performance by developing the capabilities of its people and processes (Jacobs, 1990; Swanson, 1996). Training is one area of HRD that is focused specifically on developing employees'knowledge and skills related to a job. Training effectiveness is a major issue for human resource development (HRD) professionals. Effectiveness is defined by Rumble (1986) as 'the extent an organization produces outputs that are relevant to the needs and demands of its clients"(p. 211). If a systems approach is used in the training design, and all the criteria of effectiveness are met, then distance training can be effective. A DTS as a conceptual model can guide the development of effective training in an organizational setting. A DTS was defined by Hruby-Moore (1997) as a:

> set of interrelated inputs (trainer, trainees, content, learning objectives, instructional design, communications media and management/administrative sub-systems) all of which work together in a training delivery process that results in a training outcome that leads to a performance goal. Coordination among the inputs is necessary to achieve planned learning objectives. The entire system uses feedback and situation context variables to determine if performance on the job has been achieved. (p. 281)

Within the organizational setting, each of the distance-training inputs results in an instructional delivery process to achieve the desired organizational outcomes. Some HRD researchers suggest that effectiveness is achieved when transfer of training to the job occurs (Baldwin & Ford, 1988; Rouiller & Goldstein, 1993). One of the most effective approaches to transfer of training outcomes is through on-the-job training since the training takes place in the actual environment where the job is performed. A systematic approach to on-the-job training has been developed by Jacobs and Jones (1995) and is referred to as structured on-the-job training. Structured on-the-job training or S-OJT (Jacobs & Jones, 1995) is a planned process of developing task-level expertise by having an experienced employee train a novice employee at or near the actual work setting. This planned approach to training can use a variety of methods, media and instructional techniques to create an environment for learning job related skills at a distance. For example, this study utilized S-OJT using two different training delivery approaches.

Distance Training Delivery Process (DTDP) as an Instructional Training Approach

The distance-training delivery process (DTDP) describes the instructional approach used in a DTS. An instructional approach refers to how the training course is designed and structured for delivery. The delivery process is concerned with how the trainee will interact with the training content to be learned. The instructional design decisions of what methods, media, and techniques will be used to communicate training content are seen in the actual delivery of the training. Method specifically refers to how learners are organized, usually as individual, small groups, or large audiences (Cyrs, 1997). Media refers to the devices, instruments, or technologies (hardware and software) that support the delivery of instruction (Cyrs, 1997). Instructional techniques refer to ways of organizing the interaction of learners with either the content, trainer, or other learners (Verner, 1962). According to a review by Clark (1994), many instructional designers argue it is the techniques, which cause human interaction, that are the essential component in the learning process. Often little attention is paid to interaction techniques. Techniques for interaction are often lacking in the poor designs of distance education (Clark, 1994). Clark (1994) suggests that together, the learners, instructional methods, delivery media, and techniques all have important influences on the cost and speed of learning, not just the technology. This study explores the instructional approach referred to as the DTDP. The DTDP may have implications for designing effective distance-training systems.

In terms of media, the variety of technology options available for instructional design of training is of growing interest to human resource professionals (Wagner, 1998). Often training professionals are concerned with improving training effectiveness as well as efficiency. Distance training is of special of interest to organizations as an economical use of technology to deliver its company's training packages. However, there is much controversy in the field of instructional design as to whether media really matters. The major issue with respect to distance technologies are their ability to allow for interactive techniques, and thus effective outcomes (Garrison, 1989).

Effectiveness research in distance education was found in a variety of education, instructional technology, communication, and management publications. Overall, studies conducted in educational settings over the last 45 years suggest that for groups of learners, there are no significant differences between the traditional face-to-face method of instruction and a variety of distance instructional methods on both satisfaction and learning outcomes (Russell, 1997). The problem is that most of these studies focus on just the method, media, or interaction techniques

separately from the whole distance delivery process. For example, Hunter (1995) states that research he reviewed "consistently shows training using videoconferencing is at least as effective as classroom training"(p. 81). Video-conferencing is a technology and classroom training is a group method. The techniques used for creating interaction are not discussed. Since videoconferencing and other information technologies now allow for more types of interaction and two-way communication, it is important to analyze the whole delivery process in the learning transaction (Garrison, 1989). If the technology alone does not influence outcomes, does the delivery process as a whole, including media, methods, and instructional techniques, effect training satisfaction and performance?

Course Structure, Technology, and Interactivity

Moore (1973; 1983) in his theory of transactional distance identifies course structure and dialog as the two instructional variables that can be manipulated to achieve effective learning outcomes. Moore suggests these two variables can be manipulated to reduce the amount of psychological distance between a learner and the instructor when engaged in a distance learning-teaching process sharing a common interest in some content. Distance technology, as a medium, is either used to increase or decrease the amount of structure and dialog in the teaching-learning transaction. This review is consistent with Clarke (1994) who suggests that media is not the issue, but the instructional techniques and the teacher-learner interaction. In the instructional design process of an education or training program, these variables are both influenced by the technology or medium used in the delivery process.

Course structure (Moore & Kearsley, 1996) refers to the course design variables that consist of elements of method and techniques. Course structure includes learning objectives, content themes, information presentation, case studies, pictures, illustrations, exercises, project, activities, and tests. In instructional system design, learning objectives are converted into methods and instructional technique and matched with the appropriate technology or media to bring about the desired learning and performance outcomes (Cyrs, 1997).

Dialog referred to by Moore and Kearsley (1996), is any interplay of words, actions, and ideas between the teacher and the learner when one gives instruction and the other responds. Dialog is the interaction or active participation in the training process. Wagner (1998) suggests that performance improvement specialists should look at the outcomes of interactions: Do they change the learner and move them toward action to the stated goal? Interaction is measured in this study by the total number of hours recorded by the trainee based on their interaction with their manager and/or the corporate instructor throughout their training. Research literature in cognitive and perceptual psychology supports the importance of interaction in learning (Neisser, 1976; Gardner, 1985).

Technology refers to any type of media that facilitate the process of instruction over distance of time or space. Further focus is given in this case to videotape and videoconferencing as they relate to this study. The defining characteristics of these two distance technologies or media, is their ability to facilitate real time interaction or dialog. A non-interactive, asynchronous distance technology like video-tape, is different from an interactive, synchronous distance technology such as videoconferencing. There are four major categories of distance technology delivery systems and numerous combinations to achieve course structure and dialog appropriate to meet the learning objectives. Delivery systems with distance technologies defined by Cyrs (1997) are shown in Table 1.

Table 1
Distance delivery systems with technology, from Cyrs (1997)

Delivery system	Technology/tools used in distance delivery systems
Print	Books, correspondence course, handouts, study guides, and workbooks
Audio	Radio, short-wave, telephone (wired and wireless), compact disc (CD), telephone conferencing, voice mail
Video	Videoconferencing, one-way television/two-way audio, two-way television/two-way audio, videotape, videodisc, compact disk (CD), broadcast television, compressed television, microwave, instructional television fixed service (ITFS), satellite television, and desktop video
Computing	Computer conferencing, e-mail, the Internet, multi-media, the World Wide Web, bulletin board, listserv, and fax

Garrison (1989) proposed a model or taxonomy of distance technologies as four generations of delivery systems. The capability of the technology increasingly enhances the immediacy of interaction and feedback as the generation of the delivery system increases. Table 2 shows the progression of the four generations (Garrison, 1989) and the technologies used in them.

Table 2
Four Generations of Distance Delivery Systems, from Garrison (1989)

Type of Distance Delivery System	Primary Type of Technology Used
Generation One: Individual, Correspondence Study	Print
Generation Two: Individual/Group Teleconference	Audio, Graphic, and Video-conferencing Systems
Generation Three: Individual, Computer Based Instruction	Computer Hardware and Software
Generation Four: Individual/Group, Combination Methods	Interactive Multimedia

Based on the training objectives to be accomplished, the need for interaction can be designed into the course structure and matched to the appropriate selection of technology. According to Garrison (1989), the procedures to overcome the physical and psychological distance are instructional design and interaction procedures, since the "gap" is pedagogical, not geographic. Because the physical distance contributes to a communication gap, the result is a psychological space of potential misunderstandings between the behaviors of the instructor and the learners (Moore, 1973;1983).

Combinations of distance technologies can take advantage of the synchronous (two-way) or asynchronous (one-way) nature of the communication. Each distance delivery system has its own advantages and disadvantages in terms of cost, degree of student control, degree of student and instructor interaction, flexibility, amount of instructor training required, ease or complexity of use and operation, amount and type of maintenance required, and portability (Garrison, 1989). Videotape and videoconferencing are two particular technologies that can be distinguished by these characteristics and especially by their ability to promote interaction between the student and teacher.

Course structure and dialog are both important for engaging the learner in the learning process. Course structure can cause written interactivity with the content. Dialog causes verbal interaction with the instructor or other students. The technology is important as it allows for either course structure or dialog to occur either through print, video, graphics or interactive multimedia. Moore and Kearsley (1996) in their extensive research concluded that two-way distance education systems that allow for high levels of interaction and learner control, have been found to best meet the instructional needs of adult learners. But do these variables also matter to trainees' satisfaction and performance?

Research Method and Design

The research method is classified as a case study using partnership research approach (Jacobs, 1996 ;1997). Partnership research is a method used by HRD scholars to improve practice through research. A one shot case study, using a static group comparison research design, was appropriate for studying this situation in a field setting. Static group comparison is considered a pre-experimental research design (Campbell & Stanley, 1963). Caution should be used in interpreting the findings since there was no ability to manipulate the DTS treatment or to experimentally control for extraneous variables in the setting.

The major independent variable was the distance training systems (DTS) composed of several variables that differed in trainee attributes (age, gender, cognitive style, education, and experience - specified as work, sales, industry cognitive style), two distinct DTDPs (methods, media, and techniques), different trainers, training context, and work environment. Again, the primary focus of this study was on the two levels of the DTDP. DTDP 1 is described as a 30 module self-paced, self-instructional sales training program using print and videotapes facilitated

on-site by the trainee's manager. DTDP 1 uses an individual method with a variety of interaction techniques. DTDP 2 is described as a group method of training with some self-instruction. DTDP 2 is a scheduled 3 week, 30 module sales training program using a corporate trainer to instruct new sales associates located in multiple office locations via two-way interactive videoconferencing, print and videotape. The sales training content was essentially the same. Table 3 outlines the distinctions based on method, media, instructional techniques and trainers.

Table 3
Method, Distance Technologies/Media, Training Techniques, and Trainer Influence

Distance Training Delivery Process Variables	Distance Training Delivery Process One (DTDP1)	Distance Training Delivery Process Two (DTDP2)
Method	Self-paced tutorial, with manager as facilitator in role play.	Group method, corporate instructor led with manager as facilitator in role play.
Weston & Cranton (1986) Method classification	Individualized with some experiential method	Interactive method
Distance technologies (Media) used in Delivery system	Manager as facilitator Print Videotape Computer	Corporate trainer w/Mgr. Support Print Videotape Computer Videoconferencing
Garrison (1989) distance delivery system Classification	Generation One – Print	Generation Four – Multimedia
Training instructional techniques influencing course structure and interaction	Introduction by manager Self evaluation exercises Flexible review and Feedback from manager Role play with manager Unstructured discussions With trainee & manager	Corporate Instructor directed Lecture Self evaluation exercises Scheduled excercises and Feedback from instructor Role plays with instructor Role plays with manager Structured discussion with Trainees & instructor Structured Q&A sessions Unstructured opportunities for trainees to interact
Trainer	Trainee with Manager	Corporate Trainer and Trainee with Manager

The two dependent variables of interest for the multiple regression analysis were trainee satisfaction score and job performance. The trainee evaluation was used to measure satisfaction. Job performance was sales made and measured by trainees' total number of placements reported by the manager.

Instrumentation

Instrumentation procedures included both reliability and validity. First, a pilot test for the reliability of the evaluation instrument was conducted that measured trainee satisfaction with a score. Internal consistency reliability on the evaluation instrument was calculated at alpha equal .86 on an independent sample of 100 trainee responses. A survey for demographic data was developed by the researcher with a panel of experts in April, 1999. In May, a field test was conducted with 20 trainees to review the demographic survey instrument and the instructions for the the Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, Karp, 1971). Based on the 18 responses returned, several changes were made to improve the demographic survey. Instructions for the GEFT were provided to managers. Cognitive style was measured by. Witkin & Goodenough (1981) and GEFT Test Manual reported an alpha equal .82 (Consulting Psychologists Press, 1971). The Ohio State University (OSU) Human Subjects approved the study provided each manager was contacted to request trainees' permission. A letter, instructions,

pencil, instruments, and return envelope were sent to managers who agreed to participate. Phone calls to managers for their participation in the study were made during June-October 1998 as data was being collected.

Two naturally occurring groups of trainees existed based on the two DTDPs at participating field office locations. Participants trained in the first half of 1997 were the population selected for the study. There were 78 out of 119 trainees in the self-paced training and 136 out of 408 trained in the corporate instructor-led system that actually participated in this study. Those that left the company were not considered in this study.

Research Question

A major issue in this research study was which DTDP was more effective in achieving trainee satisfaction and performance outcomes defined by the individual level? Results reported at the last AHRD conference suggested no significant difference in training satisfaction, learning, or individual performance outcomes based on the two DTDP groups (Hruby-Moore, 1999). However, a secondary questionwas: holding all variables constant in the DTS, which ones impacted trainee satisfaction and job performance? The research question guiding this part of the study was: *What portion of the variance in training satisfaction and performance can be explained by the independent variable set that defines a distance training system? Was DTDP significant in the DTS enough to impact trainee satisfaction or performance?* Multiple regression analysis was the statistical procedure used to answer this question.

Results

For these research questions, multiple regression analysis was run using SPSS version 7.5. The DTS dependent variables of training satisfaction and total placements were regressed on the independent variable set (DTDP, GEFT, number years of: sales, general work, and industry specific experience, education, number hours of interaction, gender, type of trainer, trainees' perception of their manager's involvement in their training, and work environment). Independent variables were dummy coded (see note after Table 5 for coding). Regression analysis determines the amount of variance explained in the dependent variable by the independent variable set.

Tables 4 and 5 show the results of the regression analysis to be significant at the .01 level. Results for both equations also suggest an R squared of .20 meaning 20% of the variance in both trainee satisfaction and number of placements could be explained by the DTS independent variable set. The DTS variables are those identified in the training system as: DTDP (1 and 2), trainer (self/manager vs. corporate trainer), trainee (cognitive style, age, years of work experience, sales experience, industry experience, education, gender), manager involvement (yes or no), and work environment (unstructured with focus on team/office results = 0; unstructured/individual results = dummy 1; structured/team results = Dummy 2; structured/individual results = dummy 3).

In Table 4, the number of years of work experience and manager involvement from the perspective of the trainee, were the two most significant variables influencing trainees' satisfaction score at the .05 level.

Table 4
Regression of Trainee Satisfaction Score on the DTS Independent Variable Set

Independent Variable	b	Standard Error	Beta	Significance
DTDP	3.69	2.29	.17	.11
GEFT Score	-0.25	0.19	-.11	.19
Work Experience	0.52	0.12	.45	.01*
Sales Experience	-0.20	0.17	-.14	.23
Industry Experience	-8.82	0.24	-.04	.71
Education	-0.36	0.38	-.08	.35
Interaction (dialog)	-2.01	0.04	-.05	.57
Gender	3.83	2.02	.17	.06
Trainer	-1.53	1.50	-.09	.31
Manager Involvement	13.78	3.92	.30	.01*
Work Environment	0.23	0.93	.02	.81
Dummy 1	Excluded by SPSS			
Dummy 2	-.18	2.47	-.01	.92
Dummy 3	.14	2.45	.01	.95
R = .450 R Squared = .20		F = 2.73	Sig = .002*	
Standard Error of the Estimate = 10.19		Durbin-Watson = 1.89		

In Table 5, the number of years of sales experience, the trainee's perception of their manager's involvement, and the work environment (an unstructured environment with a focus on team results and a structured work environment with focus on individual results) were the independent variables influencing job performance as the number of placements. These variables were statistically significant at .05.

Table 5
Regression of the Number of Placements on the DTS Independent Variable Set

Independent Variable	b	Standard Error	Beta	Significance
DTDP	.31	1.18	.03	.80
GEFT Score	-3.40	0.10	-.03	.73
Work Experience	-0.12	0.06	-.19	.06
Sales Experience	0.18	0.09	.25	.03*
Industry Experience	-7.11	0.12	-.06	.57
Education	-7.15	0.20	-.03	.71
Interaction (dialog)	-1.14	0.02	-.05	.54
Gender	8.98	1.05	.01	.93
Trainer	0.34	0.78	.04	.66
Manager Involvement	5.04	2.04	.21	.01*
Work Environment	1.24	0.48	.24	.01*
Dummy 1	Excluded by SPSS			
Dummy 2	.67	1.28	.05	.60
Dummy 3	-2.85	1.27	-.22	.03*
R = .449 R Squared = .20		F = 2.718		Sig. = .002*
Standard Error of the Estimate = 5.29		Durbin-Watson = 1.931		

Note: Dummy Coding for the following variables for both Table 4 and 5:
DTDP: Self-Instructional Modules = 0; Group-Videoconferencing = 1; Gender: Male = 0; Female = 1
Trainer: Self/Manager Facilitator = 0; Corporate Instructor = 1 ; Manager Involvement: No = 0; Yes = 1
Work Environment: Unstructured with focus on Team(Office) Results = 0; Unstructured with Focus on Individual Results = Dummy 1: Structured w/ Focus on Team (Office) Results = Dummy 2; Structured w/ Focus on Individual Results = Dummy 3

Conclusion

Multiple regression analysis indicated that when all DTS independent variable are considered as a set, 20% of the variance in both trainee satisfaction scores and the number of placements could be explained. Examination of this regression output suggests that DTDP was not a significant contributor to either trainee satisfaction score or placements. This finding supports the growing "no significant difference phenomenon" literature in distance education recently updated by Russell (1999). However, partial regression coefficients suggest that work experience and manager involvement were statically significant in predicting trainee satisfaction. Likewise, sales experience, manager involvement, and work environment were statistically significant in predicting the number of placements. These variables should be explored further in light of the transfer of training, human resource development, and performance literatures. Caution in the interpretation of results is limited to this data as this is a case study.

Further Research and Implications for HRD

Effectiveness of the DTS as a whole was achieved regardless of distance training delivery process (DTDP) or amount of interaction identified respectfully as course structure and dialog. However, when an instructional systems approach to training is utilized in the delivery, individual training satisfaction and performance objectives were achieved. This study does suggests that method, media, and instructional techniques are not critical in predicting overall trainee satisfaction or job performance per se, even though they may be important in learning outcomes. Analyzing the DTS as a whole, does raise new questions. For example, why and how do the number years of work experience and trainee's perception of their manager's involvement influence trainee satisfaction score. Likewise,

sales experience, trainee's perception of their manager's involvement, and work environment were significant in explaining the number of placements made. The trainee's perception of the manager's involvement was important in both of these dependent variable outcomes which supports the coaching literature. In terms of job performance, the work environment should also be explored further. What is it about the work environment structure of practices and procedures along with a focus on individual or group results that support job performance? HRD practitioners and researchers can understand how other variables do influence trainee satisfaction and job performance in a workplace setting by analyzing the DTS in this case study. However, this DTS only explained 20% of the variance in satisfaction and performance. What other variables need to be identified?

The development of distance technologies spurred by the Internet and videoconferencing are taking off (Imel, 1998). Weinstein (1997) suggests that the appeal of these technologies is the interactivity of the teacher and students and their ability to share text, graphics, audio, video, and virtual reality experiences despite physical separation. This study showed no significant difference in the mean hours of interaction; however, the variability suggests some learners need more interaction than others. Technology, interactivity and course structure for developers of training should be considered together to produce effective outcomes. However, future studies may want to separate out each of these variables. Finally, this study does offer HRD professionals and researchers an account of a DTS. It also provides a starting point to help HRD professionals decide which combinations of trainees, instructional design variables (methods, media, and techniques), trainer, content, training context, and work environment will bring about trainee satisfaction and performance, in addition to learning outcomes.

References

Baldwin, T. T., and Ford, J. K. (1988). Transfer of training : A review and directions for future research. Personnel psychology. 41, 63-105.

Campbell, D. T. & Stanley, J. C. (1963). Experimental and quasi-experimental design for research . Dallas, TX: Houghton Mifflin Company.

Clark, R. E. (1994). Media will never influence learning. Educational technology research and development, 42 (2), 21-29.

Cyrs, T. E. (1997). Teaching at a distance with the merging technologies: An instruc-tional systems approach. Center of educational development: New Mexico State University.

Gardner, H. (1985). The mind's new science: A history of the cognitive revolution. New York: Basic Books.

Garrison, D.R. (1989). Understanding distance education: A framework for the future. New York: Routledge.

Hruby-Moore, M. (1997). Distance training system: A conceptual framework. In E. Holton, (Ed.) The academy of human resource development proceedings. Atlanta, GA.

Hruby-Moore, M (1999). The effects of two training systems on trainee satisfaction, learning, job behavior, retention and organizational performance. In R. Torraco, (Ed.) Academy of human resource development proceedings. Washington, D.C.

Hunter, (1995). Distance learning and the feds. Training and development. 49, 81-83.

Jacobs, R. L. (1990). Human resource development bodies of knowledge. Human resource development quarterly, 1(3), 65-72.

Jacobs, R. L. (1996). Partnership research: Pulling rabbits from hats. Human resource development quarterly. 5 (2), 107-109.

Jacobs, R. L. (1997). HRD partnerships for integrating HRD research and practice. In R. Swanson , E. Holton (eds.). Human resource development research handbook: linking research and practice. San Francisco: Berrett-Koehler (pp. 47-61).

Jacobs, R. L., & Jones, M. (1995). Structured on-the-job training: Unleashing employee expertise in the workplace. San Francisco, CA: Berrett-Koehler Publishers.

Imel, S. (1998). Distance Education. ERIC Myths and Realities. http://www.ericacve.org.

Moore, M. G. (1973). Towards a theory of independent learning and teaching . Journal of higher education. (44), 661-679.

Moore, M. G. (1983). On a theory of independent study. In D. Seward, D. Keegan, & B. Holmberg (Eds.), Distance education: International perspectives. London: Croom Helm (pp. -).

Moore, M. G. and Kearsley, G. (1996). Distance education: A systems view. Belmont, CA: Wadsworth Publishing.

Neisser, U. (1976). Cognition and reality. San Francisco, CA: W.H. Freeman.

Rouiller, J. Z., and Goldstein, I. L. (1993). The relationship between organizational transfer climate and positive transfer of training. Human resource development quarterly. 4 (4), 377-390.

Russell, T. L. (1999). The no significant difference phenomenon as reported in 355 research reports, summaries, and papers: a comparative research annotated bibliography on technology for distance education. Office of Instructional Telecommunications: North Carolina State University.

Swanson, R. A. (1996). In praise of the dependent variable. Human resource development quarterly, 7(3), 203207-.

Wagner, E. D. (1998). Interaction strategies for online training designs. Proceedings from the 14th Annual Conference on Distance Teaching and Learning. University of Wisconsin: Madison, Wisconsin.

Weinstein, P. (1997, May-June). Education goes the distance. Technology and learning, 17(8), 24-25.

Witkin, H. A, & Goodenough, D. R., (1981). Cognitive styles: Essence and origins field dependence and field independence. Psychological Issues. Monagraph 51, New York: International Universities Press, Inc.

Witkin, H. A., Oltman, P. K., Raskin, E. & Karp, K. A. (1971). A manual for the embedded figures test. Consulting Psychologists Press, Inc.